Appendix 13.2 Planning Policy and Guidance Documents

The local and national planning guidance is summarised in the noise and vibration chapter.

The British Standards and guidance documents used in the assessment are set out below.

Construction Noise and Vibration

BS5228: 2009+A1:2014 *Code of practice for Noise and vibration control on construction and open sites*. Part 1: *Noise*

This British Standard comprises two parts but this particular one gives recommendations for basic methods of noise control where is a need for the protection of persons living and working in the vicinity of, and those working on, construction and open sites.

> *"It recommends procedures for noise and vibration control in respect of construction operations and aims to assist architects, contractors and site operatives, designers, developers, engineers, local authority environmental health officers and planners."*

In the Annexes to the code of practice there is included information on:

- the relevant legislation;
- typical noise sources and advice on mitigating them;
- sound level data for use in the prediction methods described in the standard;
- assessing the significance of noise effects;
- the estimation of noise levels, and;
- how to implement noise monitoring.

Annex E of the BS deals with the significance of noise effects. This approach addresses the need and methods for assessment of the significance of construction noise impacts when undertaking an Environmental Impact Assessment (EIA) for example.

Clause E.2 sets out two methods of assessment. Firstly it describes the "*older and more simplistic*" approach based on the advice in AL 72, noting that the original advice "*has been expanded over time to include a suite of noise levels covering the whole day/week period taking into account the varying sensitivities through these periods*." Table 3 below (Table E.2 in sub-clause E.4 of the BS) illustrates the approach.

Table A13. 1: Examples of time periods, averaging times and noise levels associated with the determination of eligibility for noise insulation

Time	Relevant time period	Averaging time, T	Noise insulation trigger level dB $L_{Aeq,T}$ A)
Monday to Friday	07.00 – 08.00	1 h	70
	08.00 – 18.00	10 h	75
	18.00 – 19.00	1 h	70
	19.00 – 22.00	3 h	65
	22.00 – 07.00	1 h	55
Saturday 07.00 – 08.00	07.00 – 08.00	1 h	70
	08.00 – 13.00	5 h	75
	13.00 – 14.00	1 h	70
	14.00 – 22.00	3 h	65
	22.00 – 07.00	1 h	55
Sunday and Public Holidays	07.00 – 21.00	1 h	65
	21.00 – 07.00	1 h	55
A) All noise levels are predicted or measured at a point 1 m in front of the most exposed of any windows and doors in any façade of any eligible dwelling.			

In sub-clause E.3 an alternative approach based on considering the change in the ambient noise level that the construction noise causes. This approach is used commonly in EIA. Two methods are described.

The first is the ABC method an example of which is set out in Table 4 below (Table E.1 in the BS). Three categories, A, B and C are described in terms of threshold noise levels for a daytime (07.00 to 19.00 weekdays, 07.00 to 13.00 Saturday), evening and weekend, and finally a night time period (23.00 to 07.00). If the combined ambient noise and construction noise exceed the relevant threshold level this is deemed a "*significant effect*".

Table A13. 2: Example threshold of significant effect at dwellings

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A A)	Category B B)	Category C C)
Night-time (23.00−07.00)	45	50	55
Evenings and weekends D)	55	60	65
Daytime (07.00−19.00) and Saturdays (07.00−13.00)	65	70	75
NOTE 1 A significant effect has been deemed to occur if the total LAeq noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level.			
NOTE 2 If the ambient noise level exceeds the threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total LAeq noise level for the period increases by more than 3 dB due to construction activity.			
NOTE 3 Applied to residential receptors only.			
A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.			
B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.			
C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.			
D) 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.			

In effect the appropriate Category is assessed using the following ambient noise level ranges:

Table A13. 3: Relevant ambient noise level ranges for the ABC approach

Assessment category and threshold value period	Ambient noise level, in decibels (dB)		
	Category A	Category B	Category C
Night-time (23.00−07.00)	≤42.4	42.5 to 47.4	≥47.5
Evenings and weekends D)	≤52.4	52.5 to 57.4	≥57.5
Daytime (07.00−19.00) and Saturdays (07.00−13.00)	≤62.4	62.5 to 67.4	≥67.5

The second method suggests that *"Noise levels generated by construction activities are deemed to be significant if the total noise (pre-construction ambient plus construction noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut off values of 65 dB, 55 dB and 45 dB $L_{Aeq,Period}$, from construction noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in significant impact."*

BS5228: 2009+A1:2014 *Code of practice for Noise and vibration control on construction and open sites*. Part 2: *Vibration*

The threshold of perception for vibration depends on the frequency. The human body is most sensitive to vibration in the frequency range 1-80 Hz. The threshold of perception is typically taken to be 0.15 mm/s and 0.3 mm/s peak particle velocity (ppv) at frequencies between 8 Hz and 80 Hz.

BS5228-2:2009+A1:2014 provides guidance on the effects of vibration from construction activities in terms of the peak particle velocity (PPV) and the table below reproduces Table B.1 of Annex B to the standard.

Table A13. 4: Guidance on effects of vibration levels

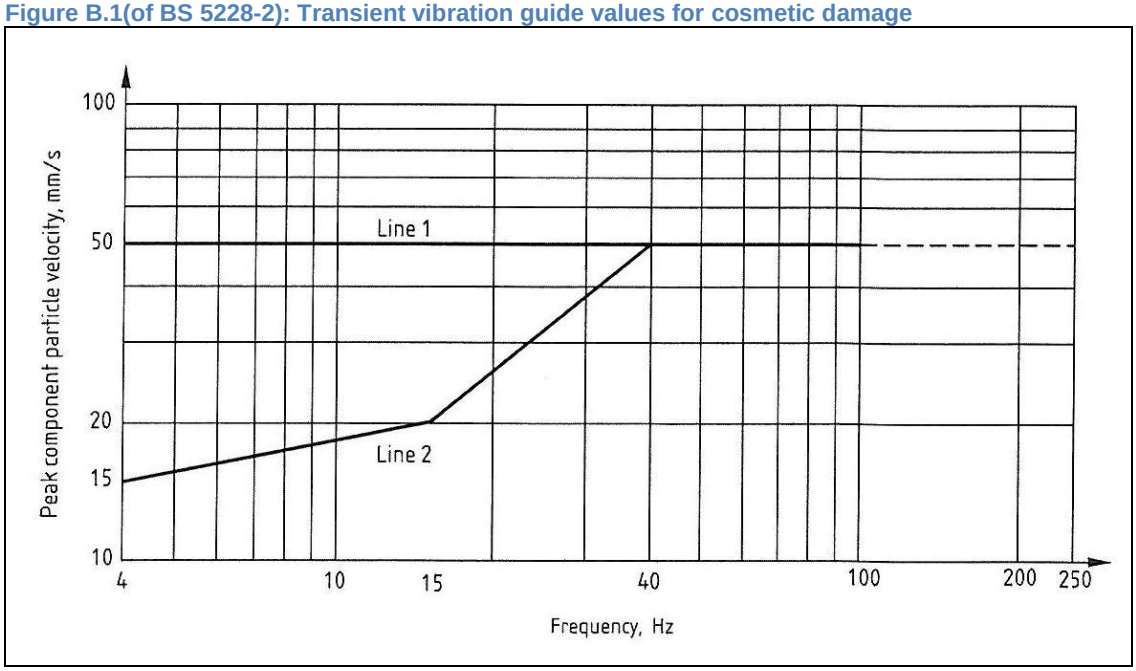
Vibration level	Effect
0.14 mm·s^{-1}	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3 mm·s^{-1}	Vibration might be just perceptible in residential environments.
1.0 mm·s^{-1}	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10 mm·s^{-1}	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

Guide values for cosmetic damage to buildings are given in Table B.2 of the standard and is as set out below, together with Figure B.1 to which it refers:

Table A13. 5: Transient vibration guide values for cosmetic damage

Line (see Figure B.1)	Type of building	Peak component particle velocity in frequency range of predominant pulse	
		4 Hz to 15 Hz	15 Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm·s^{-1} at 4 Hz and above	50 mm·s^{-1} at 4 Hz and above
2	Unreinforced or light framed structures Residential or light commercial buildings	15 mm·s^{-1} at 4 Hz increasing to 20 mm·s^{-1} at 15 Hz	20 mm·s^{-1} at 15 Hz increasing to 50 mm·s^{-1} at 40 Hz and above
NOTE 1 Values referred to are at the base of the building. NOTE 2 For line 2, at frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.			

Figure B.1(of BS 5228-2): Transient vibration guide values for cosmetic damage



Considerate Constructors Scheme

The Considerate Constructors Scheme, details of which can be found at the following web address, www.considerateconstructorsscheme.org.uk, is a scheme under which sites registered with the scheme are monitored by an experienced industry professional to assess their performance against the eight point Code of Considerate Practice which includes the categories Considerate, Environment, Cleanliness, Good Neighbour, Respectful, Safe, Responsible and Accountable. It is recommended that the main contractor be required to register the site under this scheme.

Operational Road Traffic Noise

The noise from a traffic stream is not constant but varies from moment to moment and for assessment purposes it is necessary to use an index to arrive at a single-figure estimate of the overall noise level. The index adopted by the government to assess road traffic noise is the $L_{A10,18hour}$, which is the noise level exceeded for 10% of the 18-hour period (06:00 to 24:00 hours). This parameter has been used to assess traffic noise for some time because of its good correlation with subjective response.

The former Department of Transport and Welsh Office memorandum *Calculation of Road Traffic Noise* (CRTN), published in 1988, sets out the UK standard methods for predicting and measuring road traffic noise using the L_{A10} over an 18 hour period, from 06:00 hours to 24:00 hours. UK legislation relating to compensation and insulation against road traffic noise from new or altered public highways uses this noise index.

The Design Manual for Road and Bridges (DMRB), Volume 11, Part 3 Section 7 HD213/11 Revision 1, *Noise and Vibration*, gives advice on the appraisal of noise and vibration impacts due to changes in road traffic noise and vibration for trunk roads. The DMRB identifies various stages of assessment, with each stage becoming increasingly detailed.

The objective of the DMRB noise assessment is to establish the magnitude of the significance of noise changes for areas where existing traffic is likely to at least increase by 25% or reduce by 20%. The DMRB advises that these changes are equivalent to a change in noise level of 1 dB(A), which is the minimum change that can be detected by the human ear in the short term (e.g. on opening of a development or scheme). The DMRB assessment methodology dictates that all properties experiencing changes in noise greater than 1 dB(A) should be assessed. Properties experiencing a change in noise of less than 1 dB(A) do not need to be considered, the inference being that such a slight change in the level of noise is so small as to be negligible.

A doubling or halving of the total flow of traffic would cause the noise level to change by 3 dB(A) which is considered the minimum perceptible change under normal conditions. A change in the noise level of 1 dB(A) is generally only perceptible under controlled conditions. However, the DMRB indicates that those subjected to a sudden change in noise level as low as 1 dB(A), such as that which accompanies the opening of a road scheme, may just perceive the change and experience either a benefit or disbenefit.

Industrial/Commercial Noise

BS 4142:2014 *Methods for rating and assessing industrial and commercial sound* describes methods for rating and assessing the following:

- sound from industrial and manufacturing processes;
- sound from fixed installations which comprise mechanical and electrical plant and equipment;
- sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

The methods use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

Sound from any plant associated with the proposed development in its entirety should be considered in accordance with the requirements of BS 4142:2014 and for both existing and proposed noise-sensitive receptors.

The Standard effectively compares and rates the difference between the specific sound level of the source ($L_{Aeq,T}$) and the typical background sound level ($L_{A90,T}$) in the absence of the specific sound. If appropriate, the specific sound level is corrected, by the application of one or more corrections, for acoustic features such as tonal qualities and/or distinct impulses, to give a 'rating' level ($L_{Ar,Tr}$).

The Standard advises that the time interval ('T') of the background sound measurement should be sufficient to obtain a representative or typical value of the background sound level.

Comparing the rating level with the background sound level, BS 4142 states:

> *"Typically, the greater this difference, the greater the magnitude of impact*
>
> *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context*
>
> *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context*
>
> *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."*

Code of Practice on Environmental Noise Control at Concerts

The Code of Practice is aimed specifically at "large music events involving high powered amplification held in sporting stadia, arenas, open air sites and within lightweight buildings". It defines a music event as "a concert or similar event where live or recorded music is performed by a solo or group of artists before an audience". For events held between 09:00 and 23:00 hours it provides guideline Music Noise Levels (the L_{Aeq} of the music noise measured at a particular location) 1 metre from the facade of any noise sensitive premises that are set out in Table 1 to the code of Practice.

Table A13. 6: The Noise Council guidelines for environmental noise control at concerts

Concert days per calendar year, per venue	Venue Category	Guideline
1 to 3	Urban Stadia or Arenas	The MNL should not exceed 75 dB(A) over a 15 minute period
1 to 3	Other Urban and Rural Venues	The MNL should not exceed 65 dB(A) over a 15 minute period
4 to 12	All Venues	The MNL should not exceed the background noise level by more than 15 dB(A) over a 15 minute period

For events that continue beyond 23:00 hours the Code recommends that the music noise should not be audible within noise-sensitive premises with their windows open for ventilation.

Site Suitability

BS 8233: 2014 *Guidance on sound insulation and noise reduction for buildings* provides recommendations for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new buildings, or refurbished buildings undergoing a change of use, rather than to assess the effect of changes in the external noise climate.

The Standard suggests suitable internal noise levels within different types of buildings, including residential dwellings. For reasonable resting/sleeping conditions the standard suggests that an internal noise level of 30 dB $L_{Aeq,8hour}$ within bedrooms and 35 dB $L_{Aeq,16hour}$ is specified for living rooms.

BS 8233: 2014 states that *"regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$ depending on the character and number of events per night."*

The Standard also recommends that "it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments." The standard also states that these guideline values are not always achievable in all circumstances and therefore a compromise between elevated noise levels and the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

The noise level criteria specified in BS 8233:2014 are broadly in line with those specified by the World Health Organisation (WHO) in its *Guidelines for Community Noise* as described below.

The WHO guidelines consolidate scientific knowledge on the health effects of community noise and provide guidance to environmental health authorities and professionals trying to protect people from the harmful effects of noise in non-industrial environments. The main sources of community noise are identified as road, rail and air traffic, industries, construction and public work and neighbours.

The effects of noise in dwellings are, typically, sleep disturbance, speech interference and annoyance. Relevant guideline values and the time base over which the individual guideline values apply are summarised in Table A13.6.

Table A13. 7: Guideline Values for Proposed Dwellings, dB

Specific Environment	Critical Health Effect	$L_{Aeq,T}$	Time Base, T (hours)*	L_{AFmax}
Outdoor living area	Serious annoyance, daytime and evening	55 dB	16	-
	Moderate annoyance, daytime and evening	50 dB		-
Dwellings indoors	Speech intelligibility and moderate annoyance, daytime and evening	35 dB	16	-
Inside bedrooms	Sleep disturbance, night-time	30 dB	8	45 dB
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45 dB		60 dB

*These periods are usually taken to be 07:00 to 23:00 hours (daytime) and 23:00 to 07:00 hours (night-time).